

SIEMENS



SIMOTICS GP

Low-voltage motors

External fan

Compact operating instructions

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SIMOTICS GP

Low-voltage motors Compact operating instructions for external fan


Compact Operating Instructions


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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.

 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.

 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.


If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 About these instructions

These instructions describe the machine and explain how to handle it, from initial delivery to final disposal of the equipment. Keep these instructions for later use.

Read these operating instructions before you handle the machine and follow the instructions to become familiar with its design and operating principles and thus ensure safe, problem-free machine operation and long service life.

Please contact the Service Center if you have any suggestions on how to improve this document.

Text format features

The warning notice system is explained on the rear of the inside front. Always follow the safety instructions and notices in these instructions.

In addition to the safety-related warning notices which you must read, you will find the text in these instructions is formatted in the following way:

1. Handling instructions are always formatted as a numbered list. Always perform the steps in the order given.
 - Lists are formatted as bulleted lists.
 - Lists on the second level are hyphenated.

Note

A Note is an important item of information about the product, handling of the product or the relevant section of the document. Notes provide you with help or further suggestions/ideas.

Safety notes

2.1 Information for those responsible for the plant (LVD)

This electric machine has been designed and built in accordance with the specifications contained in Directive 2014/35/EU ("Low-Voltage Directive") and is intended for use in industrial plants. Please observe the country-specific regulations when using the electric machine outside the European Community. Follow the local and industry-specific safety and setup regulations.

The persons responsible for the plant must ensure the following:

- Planning and configuration work and all work carried out on and with the machine is only to be done by qualified personnel.
- The operating instructions must always be available for all work.
- The technical data as well as the specifications relating to the permissible installation, connection, ambient and operating conditions are taken into account at all times.
- The specific setup and safety regulations as well as regulations on the use of personal protective equipment are observed.

Note

Use the services and support provided by the appropriate Service Center (Page 31) for planning, installation, commissioning, and servicing work.

You will find safety instructions in the individual sections of this document. Follow the safety instructions for your own safety, to protect other people and to avoid damage to property.

Observe the following safety instructions for all activities on and with the machine.

2.2 The five safety rules

For your own personal safety and to prevent material damage when carrying out any work, always observe the safety-relevant instructions and the following five safety rules according to EN 50110-1 "Working in a voltage-free state". Apply the five safety rules in the sequence stated before starting work.

Five safety rules

1. Disconnect the system.
Also disconnect the auxiliary circuits, for example, anti-condensation heating.
2. Secure against reconnection.
3. Verify absence of operating voltage.

2.3 Qualified personnel

- 4. Ground and short-circuit.
- 5. Provide protection against adjacent live parts.

To energize the system, apply the measures in reverse order.

2.3 Qualified personnel

All work at the machine must be carried out by qualified personnel only. For the purpose of this documentation, qualified personnel is taken to mean people who fulfill the following requirements:

- Through appropriate training and experience, they are able to recognize and avoid risks and potential dangers in their particular field of activity.
- They have been instructed to carry out work on the machine by the appropriate person responsible.


2.4 Safe handling

Workplace safety depends on the attentiveness, care, and common sense of the personnel who install, operate, and maintain the machine. In addition to the safety measures cited, as a matter of principle, the use of caution is necessary when you are near the machine. Always pay attention to your safety.

Also observe the following to prevent accidents:

- General safety regulations applicable in the country where the machine is deployed.
- Manufacturer-specific and application-specific regulations
- Special agreements made with the operator
- Separate safety instructions supplied with the machine
- Safety symbols and instructions on the machine and its packaging



 WARNING
Live parts Electric machines contain live parts. Fatal or severe injuries and substantial material damage can occur if the covers are removed or if the machine is not handled, operated, or maintained properly. <ul style="list-style-type: none">• Always observe the “five safety rules” (Page 9) when carrying out any work on the machine.• Only remove the covers using the methods described by these operating instructions.• Operate the machine properly.• Regularly and correctly maintain the machine.



! WARNING

Rotating parts

Electric machines contain dangerous rotating parts.

Fatal or severe injuries and substantial material damage can occur if the covers are removed or if the machine is not handled, operated, or maintained properly.

- Only remove the covers using the methods described by these operating instructions.
- Operate the machine properly.
- Regularly and correctly maintain the machine.
- Secure free-standing shaft ends and other rotating parts such as couplings, belt pulleys etc. against touch.



! WARNING

Hot surfaces

Electric machines have hot surfaces. Do not touch these surfaces. They could cause burns.

- Allow the machine to cool before starting work on the machine.
- Only remove the covers using the methods described by these operating instructions.
- Operate the machine properly.



! CAUTION

Hazardous substances

Chemical substances required for the setup, operation and maintenance of machines can present a health risk.

Poisoning, skin damage, cauterization of the respiratory tract, and other health damage may result.

- Read the information in these operating instructions and the product information supplied by the manufacturer.
- Observe the relevant safety regulations and wear the personal protective equipment specified.

! CAUTION

Flammable substances

Chemical substances required for the setup, operation and maintenance of machines may be flammable.

Burns and other damage to health and material may result.

- Read the information in these operating instructions and the product information supplied by the manufacturer.
- Observe the relevant safety regulations and wear the personal protective equipment specified.

 **WARNING**

Interference to electronic devices caused by electrical power equipment

Electrical power equipment generate electric fields during operation. Potentially lethal malfunctions can occur in medical implants, e.g. pacemakers, in the vicinity of electrical power equipment. Data may be lost on magnetic or electronic data carriers.

- It is forbidden for people with pacemakers to enter the vicinity of the machine.
- Protect the personnel working in the plant by taking appropriate measures, such as erecting identifying markings, safety barriers and warning signs and giving safety talks.
- Observe the nationally applicable health and safety regulations.
- Do not carry any magnetic or electronic data media.

Description

3.1 Forced ventilation (optional)

Forced ventilation (optional): Type of cooling IC 416 in accordance with EN / IEC 60034-6

Cooling that does not depend on the speed is achieved by means of a unit that is independent of the motor operating state (forced ventilation). This unit is closed to the outside by a fan cover. It has its own main drive with fan impeller which creates the cooling air flow required for cooling the motor.

3.2 External fan units

IL and IL I series

The units are generally supplied ready for installation. The bearings are designed to be maintenance-free for the service life of the units.

3.3 Degree of protection

The machine has a type of protection as stamped on the rating plate, and can be installed in dusty or humid environments.

3.4 Certification

The external fans are certified in accordance with UL and CSA.

Description

3.4 Certification

Preparing for use

Good planning and preparation of machine applications are essential in terms of keeping installation simple and avoiding errors, ensuring safe operation, and allowing access to the machine for servicing and corrective maintenance.

This chapter outlines what you need to consider when configuring your plant in relation to this machine and the preparations you need to make before the machine is delivered.

4.1 Safety-related aspects to consider when configuring the plant

A number of residual risks are associated with the machine. These are described in the chapter titled "Safety information" and in related sections.

Take appropriate safety precautions (covers, barriers, markings, etc.) to ensure the machine is operated safely within your plant.

4.2 Observing the operating mode

Observe the machine's operating mode. Use a suitable control system to prevent overspeeds, thus protecting the machine from damage.

4.3 Delivery

Checking the delivery for completeness

The drive systems are put together on an individual basis. When you take receipt of the delivery, please check immediately whether the items delivered are in accordance with the accompanying documents. Siemens will not accept any claims relating to items missing from the delivery and which are submitted at a later date.


- Report any apparent transport damage to the delivery agent immediately.
- Report any apparent defects/missing components to the appropriate SIEMENS office immediately.


Archive the safety and commissioning notes provided in the scope of delivery as well as the optionally available operating instructions so that these documents are always easily accessible.

The rating plate optionally enclosed as a loose item with the delivery is provided to enable the motor data to be attached on or near the machine or installation.

When carrying out any work on the machine, observe the general safety instructions and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

5.1 Ventilation

 WARNING
Overheating and failure of the motor Death, severe injury or material damage can occur if you do not carefully observe the following points. <ul style="list-style-type: none">• Do not obstruct ventilation.• Prevent the air expelled by neighboring equipment from being immediately sucked in again.• For machines with a vertical type construction with air entry from above, prevent the ingress of foreign bodies and water in the air entry openings (standard IEC / EN 60079-0).• If the shaft extension is facing upwards, liquid must be prevented from entering by moving along the shaft.

 WARNING
Damage caused by small parts falling in Material damage and injury can occur if the fan is destroyed and therefore the motor overheats. <ul style="list-style-type: none">• For types of construction with the shaft extension facing downwards, prevent small parts from falling into the fan cover by providing suitable covers (standard IEC / EN 60079-0).• Prevent the cooling airflow from being reduced as a result of covers that might be in place.

5.2 Preparing for installation

5.2.1 Requirements for installation

The following requirements must be satisfied prior to starting installation work:

- Staff have access to the operating and installation instructions.
- The machine is unpacked and ready for mounting at the installation location.

Note

Measure the insulation resistance of the winding before starting installation work

Wherever possible, measure the insulation resistance of the winding before starting installation work. If the insulation resistance lies below the specified value, take appropriate remedial measures. These remedial measures may necessitate the machine being removed again and transported.

Note

Note also the technical data on the rating plates on the motor enclosure.

NOTICE

Damage to the motor

To avoid material damage, before commissioning, check whether the correct direction of rotation of the machine has been set on the customer side, e.g. by decoupling from the driven load.
--

5.2.2 Notes regarding installation

NOTICE

Damage during installation

Avoid unbalance in order to prevent negative effects on the service life.

Prior to installation, ensure that the fan impeller rotates freely and that the impeller blades do not become deformed or bent.

5.3 Installing protective cover

Installing protective cover

- Loosen the flange screws (Instar screws)
- Slide in the mounting brackets
- Retighten the flange screws.

6

Electrical connection



DANGER

Hazardous voltages

Death, injury or material damage can occur. Note the following safety information before connecting-up the machine:

- Only qualified and trained personnel should carry out work on the machine while it is stationary.
- Disconnect the machine from the power supply and take measures to prevent it being reconnected. This also applies to auxiliary circuits.
- Check that the machine really is in a no-voltage condition.
- Establish a safe protective conductor connection before starting any work.
- If the incoming power supply system displays any deviations from the rated values in terms of voltage, frequency, curve form or symmetry, such deviations will increase the temperature and influence electromagnetic compatibility.
- Operating the machine on a line supply system with a non-grounded neutral point is only permitted over short time intervals that occur rarely, e.g. the time leading to a fault being eliminated (ground fault of a cable, EN 60034-1).

Circuit diagram

The electrical connection should be performed according to the circuit diagram based on the operating mode (single-phase or three-phase).

Electrical connection options (Page 27)

Please also observe the information given on the terminal box cover.

6.1 Permissible current values

Permissible current values

The permissible current values can be found on the rating plate of the external fan unit.

7.1 Measures before start-up

NOTICE
Damage to the machine In order to avoid material damage, check the following points before commissioning the motor: <ul style="list-style-type: none">• Using appropriate measures, check whether the correct direction of rotation of the motor has been set by the customer, e.g. by decoupling from the driven load.• Ensure that temperature-sensitive parts (cables, etc.) are not in contact with the machine enclosure.• Ensure that the condensation drain holes are always located at the lowest part of the motor.

NOTICE
Damage caused by insufficient cooling Effective cooling is no longer possible if air guidance of the machine is not provided as intended. This can damage the machine. <ul style="list-style-type: none">• Before commissioning, attach the covers to guarantee the intended air guidance.

NOTICE
Damage during installation Avoid unbalance in order to prevent negative effects on the service life. Prior to installation, ensure that the fan impeller rotates freely and that the impeller blades do not become deformed or bent.

Note

Provide protection for the fan if required via an external safety device (e.g. motor circuit breaker).

Measures

Once the system has been correctly installed, you should check the following prior to commissioning:

- Ensure that the machine has been correctly installed and aligned.
- Connect the machine corresponding to the specified direction of rotation.
- Ensure that the operating conditions match the data specified on the rating plate.

- Lubricate the bearings, depending on the version. Ensure that machines with roller bearings, which have been stored for longer than 24 months, are relubricated. Also observe the notes in Chapter Preparation for use (Page 15).
- Ensure that any optional supplementary machine monitoring equipment has been connected correctly and is functioning as it should.
- For versions with bearing thermometers, check the bearing temperatures when the machine starts to run for the first time. Set the values for alarm and shutdown at the monitoring device. Also observe the notes in Chapter Setting values for monitoring the bearing temperature.
- Corresponding to the control and speed monitoring functions implemented, ensure that the machine cannot exceed the permissible speeds specified on the rating plate.
- Ensure the correct setting conditions of the drive output elements depending on the type (e.g. alignment and balancing of couplings, belt forces in the case of a belt drive, tooth forces and tooth flank backlash/play in the case of gear wheel output, radial and axial clearance in the case of coupled shafts).
- Comply with the minimum insulation resistances and minimum air clearances.
- Ensure correct grounding and potential bonding connection of the protective conductor.
- Tighten all mounting bolts, connection elements and electrical connections to the specified torques.
- Remove any lifting eyes that were screwed after installation – or secure them to prevent them becoming loose.
- Rotate the rotor to ensure that it does not touch the stator.
- Implement all touch protection measures for both moving and live parts.
- Ensure that free shaft extensions cannot be touched, e.g. by attaching covers.
- Secure any featherkeys so that they cannot be flung out.
- Ensure that the optional external fan is ready for operation and connected so that it rotates in the specified direction.
- Ensure that the cooling airflow is not obstructed or diminished in any way.
- If an optional brake is being used, ensure that it is functioning perfectly.
- Comply with the specified mechanical limit speed n_{max} , and ensure that it is not exceeded.

If the design of the machine requires the converter to be assigned in a particular way, the relevant information will be provided on the rating plate or an additional label.

Note

It may be necessary to perform additional checks and tests in accordance with the specific situation on site.

7.2 Installation instructions

Installation instructions

- Initiate a test run following installation.
- Ensure that the air current is sucked in through the ventilation grille and blown over the motor intended to be cooled.
- Check the direction of rotation using the arrow on the internal surface of the ventilation grille.

When carrying out any work on the machine, observe the general safety instructions and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

8.1 Safety instructions during operation

Switching on the machine



DANGER

Hazardous voltages

Electrical machines are at hazardous voltage levels. Contact with these can result in death, serious injury or material damage.

Operating the machine on a line supply system with a non-grounded neutral point is only permitted for short periods of time that occur rarely, e.g. the time leading to a fault being eliminated. Cable ground fault EN / IEC 60034-1.

WARNING

Faults in operation

Changes with respect to normal operation indicate that there is an impaired function. This can cause faults which can result in eventual or immediate death, severe injury or material damage.

For instance, observe the following signs that could indicate a malfunction:

- Higher power drawn than usual
- Higher temperatures than usual
- Unusual noises
- Unusual smells
- Response of monitoring equipment

Immediately contact the maintenance personnel if you identify any irregularities. If you are in doubt, immediately switch off the machine, being sure to observe the system-specific safety conditions.

8.2 Safety instruction regarding forced ventilation/external fan (optional)

Forced ventilation (optional): Type of cooling IC 416 in accordance with EN / IEC 60034-6



WARNING

Risk of burning

Operating the machine without external fan results in overheating. This may result in death, personal injury and material damage.

- Never commission the machine without an external fan.

8.3 Protective cover

NOTICE

Avoidance of unbalance

Particularly in dusty environments, ensure that an above-average level of dust does not accumulate on the fan blades during operation.

The result can be a level of unbalance that will reduce the service life.

This also applies to atmospheres containing particles e.g. in the wood processing industry or in coal mills.

Use a protective cover for these or similar application areas.

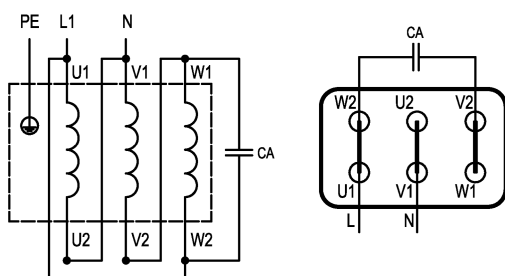
Circuit diagrams

9.1 Electrical connection options

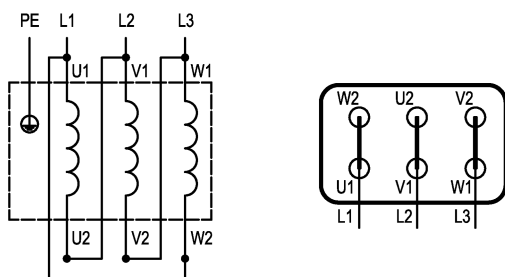
Electrical connection options

IL and IL I series

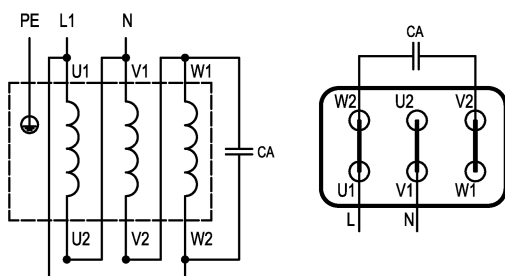
Star connection



Delta connection



Steinmetz delta connection



U1 (T1) = black
 V1 (T2) = light blue
 W1 (T3) = brown

U2 (T4) = green
 V2 (T5) = white
 W2 (T6) = yellow

10

Spare parts

10.1 Parts order

In addition to the exact part designation, please specify the machine type and the serial number in all orders for spare parts and repair parts. The part designation must be identical to the designation stated in the list of parts and specified together with the appropriate part number.

When spare and repair parts are ordered, the following details must be provided:

- Designation and part number
- Order number and serial number of the machine

Spare parts information and database

Using the Siemens order number and the associated serial number, you can download spare parts information from a database for almost all current motors → Spares On Web (https://b2b-extern.automation.siemens.com/spares_on_web)

Service & support

A.1 Siemens Industry Online Support

Technical queries or additional information



If you have any technical queries or you require additional information, please contact Technical Support (<https://support.industry.siemens.com/cs/ww/en/sc/2090>).

Please have the following data ready:

- Type
- Serial number

You can find this data on the rating plate.

Contact person



If you wish to request on-site service or order spare parts, please contact your local office. This office will contact the responsible service center on your behalf. You can find your contact person in the relevant contact database:

www.siemens.com/yourcontact

Siemens Support for on the move



You can obtain optimum support anywhere you go using the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone.

A.2 SIOS references for low-voltage motors

You can find the associated operating instructions here:



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Siemens AG
Process Industries and Drives
Postfach 48 48
90026 NÜRNBERG
GERMANY

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